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ABSTRACT

This study examined the effectiveness of a training program designed to help disadvantaged teenage mothers promote their infants' early cognitive development. Subjects were 127 mothers whose babies were less than 6 months old at the start of the program; most were white women near the poverty level, and many were unmarried. The control group consisted of 171 mothers classified into three subgroups according to their level of motivation, as indicated by degree of participation in the program. In the experimental program mothers attended 3-hour sessions for 10- to 12-weeks. Sessions focused on infant and child management techniques and practical teaching skills. A second component involved the mailing of supplemental booklets to participants every 2 months until their children were 48 months old; the booklets, written at sixth grade reading level, offered suggestions for progressively more complex mother-infant interactions. It was hypothesized that by the time the children were 3 years old the training program would result in significant differences in cognitive development between the experimental and control groups; as measured by the Bzoch-League Receptive-Expressive Emergent Language Scale, the Utah Test of Language Development and the Bayley Scales of Infant Development. Results of the program after 12 months and 24 months are reported. (BF)

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Parent Training in Preprimary Competence

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Our reasoning in conducting the present study was that, since learning is well known to be very strongly related to the number of reinforcements and parents are in position during infancy to administer the maximum number of reinforced experiences, motivated parents knowledgeable in "What, Whe and How" to teach their infants should be highly effective in giving infants a strong start in cognitive development. The inferred need (Bronfenbrenner, 1974) for very early intervention and the paucity of studies of intervention either with parents whose infants were under 15 months of age or with the infants themselves, argued for investigations with new-borns.

It was hypothesized for a target population of relatively low socio-economic status that (1) parents can be highly effective intervenors in early cognitive development of their infants, (2) parents trained in how to intervene with their child beginning at birth will produce significant gains in cognitive development as compared to matched controls, and (3) timely availability of detailed lists of specific types of experiences appropriate at each age level is essential if poorly educated and generally non-scholarly parents are to be expected actually to provide the needed experiences to their infants. It was assumed that a high proportion of such parents are motivated to further the development of their offspring. It is noteworthy that our hypotheses parallel the later conclusions by Bronfenbrenner, (1974, p. 47) that infants need an enduring relationship of intensive interaction with an adult, strong support for the mother-child system, and the systematic involvement of the child in progressively more complex activities, first in the context of the mother-child relationship and later in the preschool program. All of these essentials already were incorporated in the present study, and careful attention has been given to making the mother-infant interaction mutually rewarding in order to maximize the continuing motivation of the mother (or other caregiver).

The training program described below, followed by timely provision of mailed booklets with suggestions for progressively more complex stimulation and interaction, was hypothesized to result in time in significant differences in cognitive development of the experimental and control group infants in favor of the experimental group as measured by the Bzoch-League Receptive-Expressive Emergent Language Scale (REEL), (Bzoch and League, 1971), Utah Test of Language Development (Mecham, Jey and Jones, 1967), and the Bayley Scales of Infant Development (1969). It was further hypothesized that at one year of age these differences would be non-significant although favoring the experimental group; that at two years of age the differences might be significant; and that by three years of age that they would be significant.

The experimental treatment was twofold: (1) a 10 to 12 week, three hours per session course in infant/child management techniques and in practical teaching skills for mothers of newborns under six months at the start of the course, including several who delivered during the early part of the course and including a few fathers who came with the mother. Other family members occasionally attended with the mother and (2) Supplemental booklets on "What, How and When to Teach Babies" (Bensen and Truss, 1975 and 1976) covering two month

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life intervals, given to the student mothers and later mailed every two months until age 48 months. These describe appropriate interactions and experiences for the age level.

During the training program information on methods of effective stimulation of children was disseminated to the experimental group via discussion, slides, films, and animal training. Booklets appropriate to the baby's age plus one to two months continue to be given or mailed to the experimental members every other month, but not to the control members. The booklets contain suggestions for appropriate stimuli, experiences and interactions for that particular two month age interval. Because most of the parents were high-school dropouts, including many who did not finish 8th grade, care was taken to keep the language level at approximately 6th grade and to have extensive pictorial accompaniment to the text. Emphasis in the booklets and during the training sessions was on timely and appropriate interaction between parents and the child. The reasoning justifying the recommended experiences accompanies each section of the booklets. Small animal training sessions were an essential factor because teaching animals (pigeons in this case) allows explication of the techniques needed for more effective teaching of infants, i.e., patience, readiness, timing, value of reward, effects of too much irrelevant stimuli, effects of inconsistent reinforcement, of reinforcement schedules, etc. Correlates to child training were pointed out, with much emphasis upon the use of operant techniques to encourage development of cognitive aspects of behavior such as concept formation via shaping, upon encouraging development of problem-solving strategies and, through appropriate use of reinforcement, for "trying."

Subjects were mothers or expectant mothers whose babies would be less than six months of age at the start of the training program. All but 3 were white, many were unmarried and 1/4 were Cuban. They were recruited from eligible outpatients in a free county-operated clinic with a special program for teen-age parents and in general may be considered as a border-line poverty group. Extensive socio-economic and demographic data (33 variables) will permit many of the infants to be matched in pairs with relatively similar profiles when sufficient data have been accumulated. This population was selected because of the evidence that children of this population enter school with a greater number and/or larger degree of deficits than do children of parents in higher socio-economic levels. The goal of this program is to prevent or minimize lags in development. To this end, booklets are not furnished covering periods more than two months beyond the chronological age of the very young infants, nor more than four months beyond that of four year olds. Direct contacts by the investigator group with mothers of the experimental group children was limited to the preliminary interviews to obtain consent to participate as either experimentals or controls, and to the ten week training program. Contact with the control mothers was limited to the preliminary interview for consent to participate. Experimental group mothers received a stipend of $10 per session. Mothers in both groups receive $3 when the infant is tested.

The following table is a breakdown of our recruiting efforts:

Clinic file reviewed		680
Excluded-child too old for study	176	
Attempted interviews		504
Unable to contact	138	
Successful contacts		366
Spanish speaking only--excluded	25	
Miscarriages, abortions, adoptions	18	
Possible subjects		323
Not willing to participate	18	
Not able to attend classes but willing to have a child tested yearly	57	
Pool for class selection		248
Selected for class participation	190	
Did not show up for class	56	
Dropped out after attending 1 to 4 classes	7	
Final number in experimental group		127
Best control--randomly selected	58	
Control only--could not attend but willing	57	
Controls-invited to class but did not show up	56	
Final number in control group who have been or will be tested		171

Because 29% (56) of those parents invited to attend our classes did not show up, and because 57 others could not or did not wish to attend and were not included in the selection pool, the experimental group may not be a truly representative sample of the population from which they were selected, even though our recruiting sample was exhaustive and representative of the health clinic's white clientele of new mothers. It may be that the parents who did not attend classes even when invited constitute a less motivated group than those who completed the course, and those parents who only consented to have their child tested at yearly intervals may be even less motivated than those who attended. We therefore have pooled the controls into three groups: best controls,

control only, and those invited to class after random selection who did not show. These will be treated both as a complete control group and as three separate control groups. This will permit 'teasing out' the role of motivation differences, if any, between the training group and the control groups. This follows from the fact that upon initial random selection from those mothers who consented to be in either the training group or the control according to random selection, the two groups (selected for training and not for training) should have equal means within the limits of randomicity. As may be seen in Figures 1, 2, 4 and 5, for these means to be equal, there is only one value ( ), shown by the preceding symbol, which the training group could have had as a mean uninfluenced by later training. As may be seen there is st ong evidence for a training effect in that the mean of the Trained group infants is higher than could be accounted for by self-selection through motivation for the REEL at both 12 and 24 months on both the Receptive and Expressive scales, and on the Utah at 24 months. Also, on the Caldwell Home Inventory, training apparently has raised the Maternal Involvement with the Child both at 12 and 24 months, and the degree of Emotional and Verbal Responsibility of the Mother at 24 months while appearing to reduce it at 12 months. There are indications in the social psychology literature that for a few months after training the mothers might, indeed, feel less responsible even while becoming strongly involved with the Child, in effect relying on what they learned in the training program.

Finally, in order to obtain as complete a picture as possible, we have tested a group as controls who were willing to have their infants tested, but could not or did not wish to be considered for selection to come to class. We also are testing as many of the seven parents who dropped out after attending from one to three classes as we can.

Results

Results on the Bzoch-League Receptive-Expressive Emergent Language for the measurement of Language Skills in infancy are shown in Tables 1 and 2 for 12 and 24 months, respectively, for the Trained and control groups which were described above. Table 3 shows that significance between each control group and the trained group reaches the .05 level, one-tailed, for the random control group and two-tailed for the other two groups on Receptive development at 12 months. At 24 months Receptive scores of the Trained group no longer exceed those of the Random Control group, because the available Random Control group scores include several very high scores. In other words, as can be seen in Figure 3, the Trained group remains higher than any control group, but does not gain as much as the Random Control group between 12 and 24 months. Table 32/50 shows that at 12 months Expressive scores of the Trained group do not significantly exceed those of the Random Control group (although they are higher) while they are significantly higher than either of the other two control groups. At 24 months, however, as we predict, the Trained group significantly exceeds the Random Controls, and also the Allowed Testing group, and is non-significantly higher than the Invited, did not show group. Differences among the control groups are in no case significant.

Two scales of the Caldwell Home Inventory are relevnat to the issue of motivational differences of the mother. As can be seen in Table 4 and in Figures 4 and 5, Scale 5, Maternal Involvement with the Child, at twelve months places the trained group almost at stanine 6, and at 24 months it exceeds 6.

The only significant difference occurs between the Random (Best) Controls and those selected for class who did not come, but this difference is much reduced by 24 months and is non-significant. Figure 4 shows some apparent surplus of involvement with the child for the Trained group even after allowing for some enhanced motivation among those who actually came to class compared to the Random control group. As noted previously the training may have had some temporary negative effect upon the mother's emotional and verbal responsibility although the differences are not significant. Figure 5 shows a surplus for the Trained group of both maternal involvement and of emotional and verbal responsibility of the mother although the differences do not reach significance.

Figures 6a and 6b show that the Trained group, the Random Control group and the Invited, did not come groups are well matched on a variety of demographic variables, with no apparent systematic biases.

In summary, results of the program to date show that there is essentially no loss in the Trained group between 12 and 24 months in either Receptive or Expressive language development, and the Trained group becomes significantly higher than the Random Controls on Expressive Language at 24 months. Since most parent and child training programs of short duration in the past have shown sizable losses in scores a year or so after training has ceased, these results support the hypothesis that this is an effective program. It should be noted that children of disadvantaged parents do not generally show significant losses until after the age of two years. Our goal has not been to raise the level of development above the norm, although this seems to be happening so far, but to prevent the usual deficits from developing after age two when language use begins in earnest. If our control groups follow the usual pattern significant losses will begin soon, while the infants of trained parents have a considerable margin above the norm to lose before they are reduced even to normal levels. Our hope is that the design of the program is such that even this will not occur.

Table 1

Receptive-Expressive Emergent Language Scale

Receptive Language Score

Group	One Year Scores N	%	Mean	SD	SE	Two Year Scores N	%	Mean	S	SE
Trained	83		119.30	18.65	2.06	37		118.00	20.71	3.45
Deleted, Illness	6		102.83	15.28	6.83	9		96.11	10.40	3.68
Deleted, Examiner	1		158.00	-	-					
Total Tested	90					46				
Not able to test	36	29				31	40			
Total eligible	126					77				
Best controls	12		109.75	13.57	4.09	12		114.50	16.87	5.09
Deleted, illness	1		117.00	-	-	3		105.33	9.23	6.53
Deleted, examiner	14		84.43	21.09	5.85	0				
Total tested	27					15				
Not able to test	10	27				3	17			
Total eligible	37					18				
Selected for class, but did not come	20		106.40	9.91	2.27	8		104.13	13.94	5.27
Deleted, illness	7		99.50	26.47	11.84	0				
Total tested	27					8				
Not able to test	18	40				14	64			
Total eligible	45					22				
Willing to be tested, could not attend class	54		104.61	16.00	2.20	19		106.95	15.52	3.66
Deleted, illness	3		91.67	11.00	7.78	2		88.50	10.61	-
Total tested	57					21				
Not able to test	31	35								
Total eligible	88									
Dropouts (3 classes)	3		94.67	21.13	-	2		99.00	4.24	-
Deleted, illness	1		73.00	-	-	0				
Total tested	4					2				
Not able to test	7	64				5				
Total Eligible	11					7				

Expressive Language Score

One Year Scores					Two Year Scores		
Mean	SD	SE	N	%	Mean	SD	SE
115.49	21.61	2.39	37		113.95	15.23	3.20
88.00	28.20	12.61	9		94.33	17.47	6.18
158.00	-	-	0				
			46				
			31	40			
			77				
110.50	15.97	4.82	12		100.75	12.65	3.81
117.00	-	-	3		94.00	19.05	13.47
76.14	17.78	4.93	0				
			15				
			3	17			
			18				
104.55	13.13	3.01	8		104.63	16.13	6.10
87.29	23.25	9.49	0				
			8				
			14	64			
			22				
104.63	18.46	2.54	19		102.42	16.23	3.72
84.67	16.74	11.84	2		84.50	4.95	-
			21				
			39				
			60				
83.33	8.50	6.01	2		91.00	4.24	-
73.00	-	-	0				
			2				
			5				
			7				

Table 2

Utah Test of Language Development

Two Year Scores

Group	N	%	Mean	SD	SE
Trained	35		125.23	30.35	5.20
Deleted, illness	7		91.71	22.99	9.39
Total tested	42				
Unable to test	35	45			
Total eligible	77				
Best Controls	10		119.50	15.58	5.19
Deleted, illness	3		92.67	17.21	12.16
Total tested	13				
Unable to test	24	65			
Total eligible	37				
Selected for class, did not come	11		107.36	23.32	7.37
Deleted, illness	0		-	-	-
Total tested	11				
Unable to test	5	31			
Total eligible	16				
Allowed testing, could not come	16		111.06	23.53	6.08
Deleted, illness	1		108.	-	-
Total tested	17				
Unable to test	43	72			
Total eligible	60				

Table 3

Significance Tests(t)
Two-tailed

Receptive-Expressive Emergent Language Scale

Twelve Months

N		Receptive			Expressive		
		T	RC	Invited	T	RC	Invited
83	Trained						
12	Random Controls	.1			ns		
20	Invited to Class, did not come	.05	ns		.05	ns	
54	Allowed testing only	.001	ns	ns	.01	ns	ns

Twenty-four Months

37	Trained						
13	Random Controls	ns			.05		
8	Invited to Class, did not come	.1	ns		ns	ns	
19	Allowed testing only	.001	ns		.05	ns	ns

Utah Test of Language Development Twenty-four Months

35	Trained			
10	Random Controls	ns		
11	Invited to Class, did not come	.1	ns	
16	Allowed testing only	ns	ns	ns

Table 4

Caldwell Home Inventory (Birth to Three)
Maternal Involvement with the Child

	At One Year				At Two Years			
	N	Mean	SD	SE m	N	Mean	SD	SE
TRAINED	36	5.77	1.97	.33	34	6.74	1.71	0.298
Deleted, illness	3	5.00	2.00	-	9	6.00	2.12	.750
(Pooled)	39	5.72	1.95	.316	43	6.65	1.73	0.267
BEST CONTROLS	12	5.08	1.92	.58	6	5.33	1.37	
Deleted, illness	1	5.00	-	-	4	5.00	2.31	
(Pooled)	13	5.07	1.84	.531	10	5.20	1.69	0.56
SELECTED FOR CLASS did not come	12	4.08	2.02		8	6.00	2.00	0.76
Deleted, illness	6	5.33	2.06		0	-	-	
(Pooled)	19	4.50	2.07	.502	8	6.00	2.00	0.76
WILLING TO BE TESTED	32	4.31	1.86	.334	21	5.14	2.03	
Deleted, illness	3	5.00	2.64	-	2	3.50	3.54	
(Pooled)	35	4.37	1.90	.326	23	5.00	2.13	0.45
DROPOUTS					2	4.00	4.24	-
Scale # 1					0			
					2			
TRAINED	36	6.11	1.92		34	6.79	1.61	
Deleted, illness	3	4.67	2.89		9	6.11	2.15	
(Pooled)	39	6.00	2.00		43	6.65	1.74	0.268
BEST CONTROLS	12	6.00	1.13		6	6.50	1.38	
Deleted, illness	1	5.00	-	-	4	5.75	1.50	
(Pooled)	13	5.92	1.12	.32	10	6.20	1.39	0.46
SELECTED FOR CLASS did not come	12	3.91	1.62		8	5.55	1.46	0.55
Deleted, illness	6	5.33	2.06		0			
(Pooled)	18	4.39	1.85	.45	8	5.55		0.55
WILLING TO BE TESTED	32	5.22	1.58		32	4.31	1.86	
Deleted, illness	3	6.33	1.15		3		1.89	
(Pooled)	35	5.31	1.57	0.27	35	4.37	1.89	0.32
DROPOUTS					2	6.50	.71	-

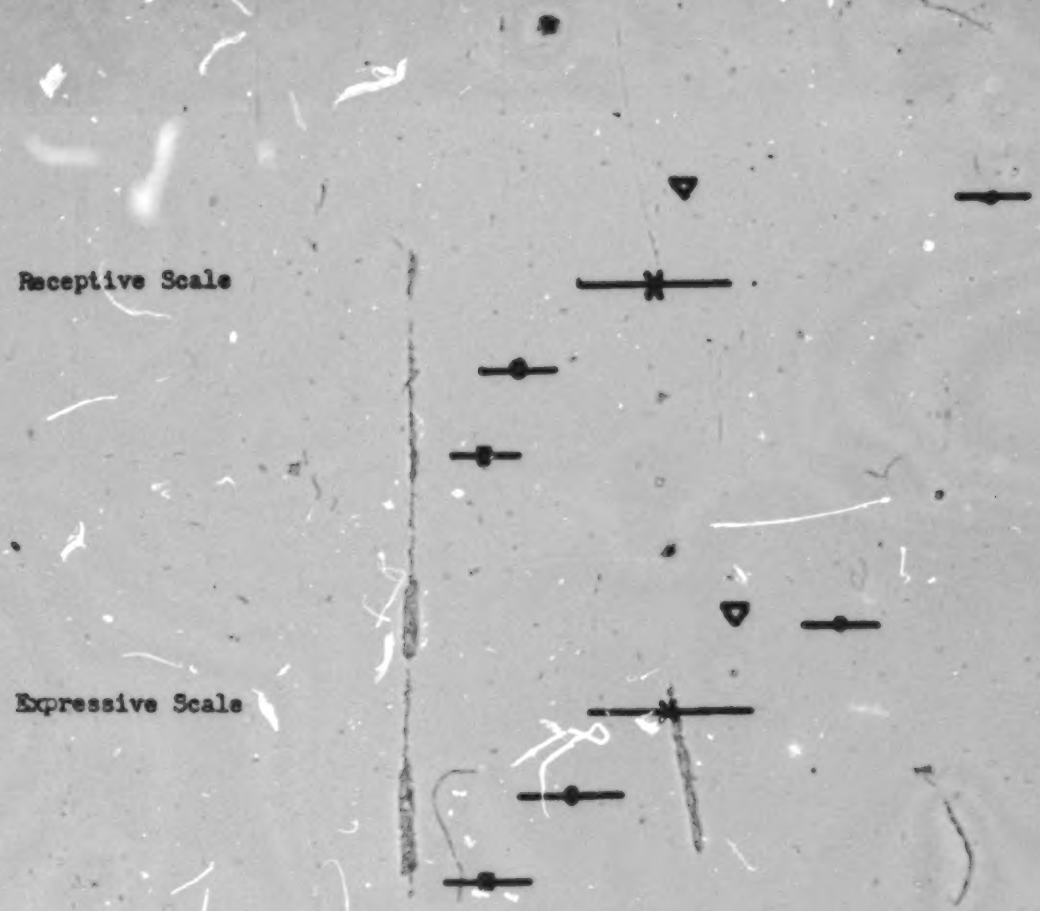
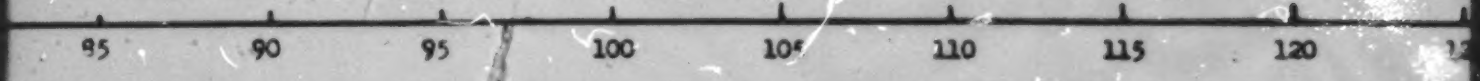


Fig. 1 Receptive-Expressive Language Scale Means and SE at 12 Months. Infants of-

- • Trained mothers (N = 83)
- X Random Controls (N = 12)
- o Invited to Class, did not come (N = 20)
- □ Allowed testing only (N = 54)
- ▽ Mean of Trained group if originally Trained group plus Invited = Random group mean.



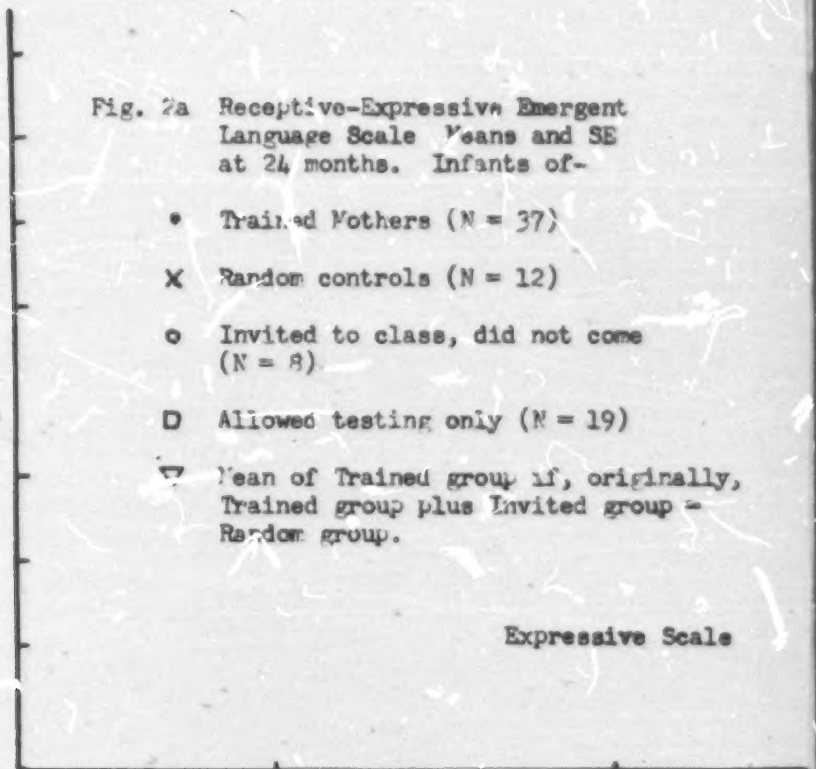


Fig. 2a Receptive-Expressive Emergent Language Scale Means and SE at 24 months. Infants of-

- • Trained Mothers (N = 37)
- X Random controls (N = 12)
- o Invited to class, did not come (N = 8)
- D Allowed testing only (N = 19)
- ▽ Mean of Trained group if, originally, Trained group plus Invited group = Random group.

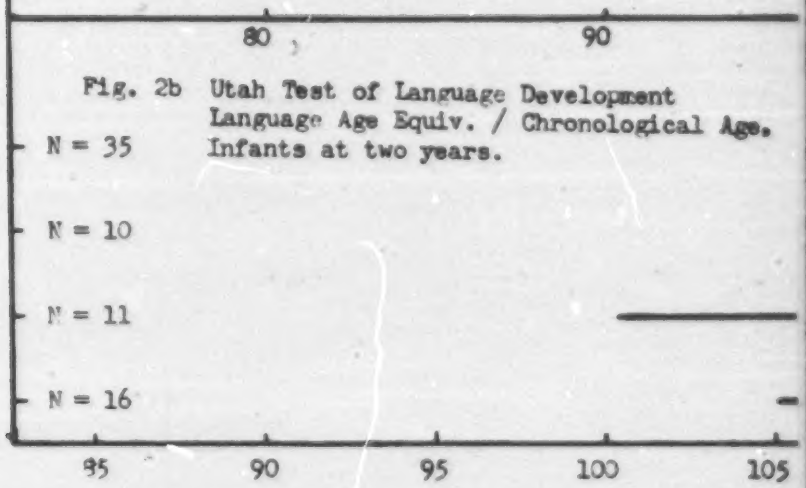
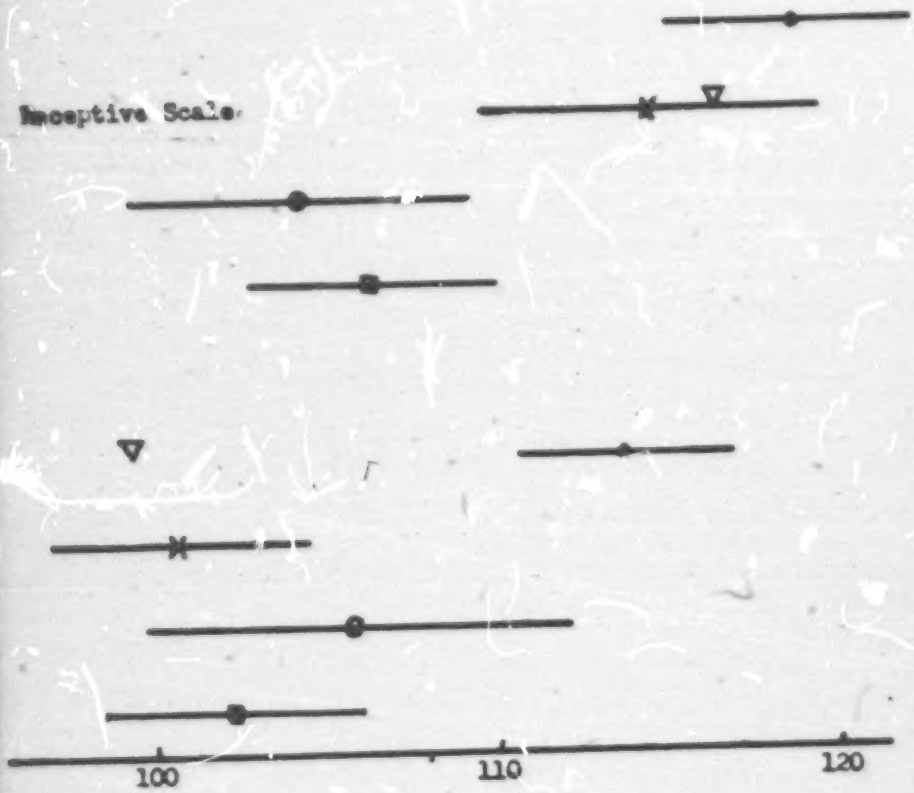
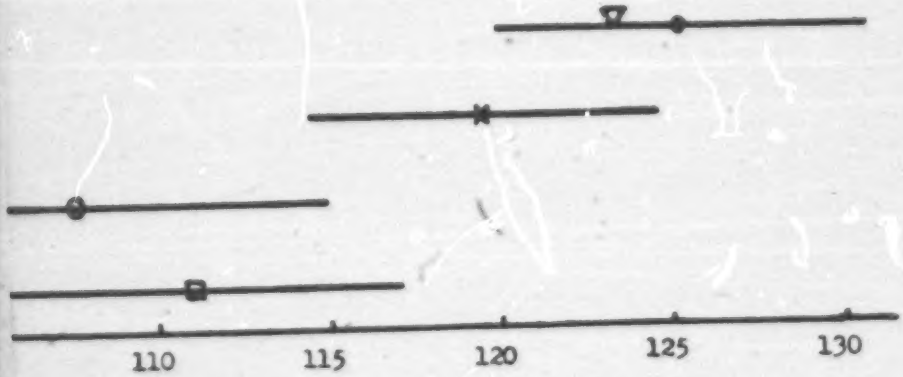


Fig. 2b Utah Test of Language Development Language Age Equiv. / Chronological Age. Infants at two years.

Inceptive Scale





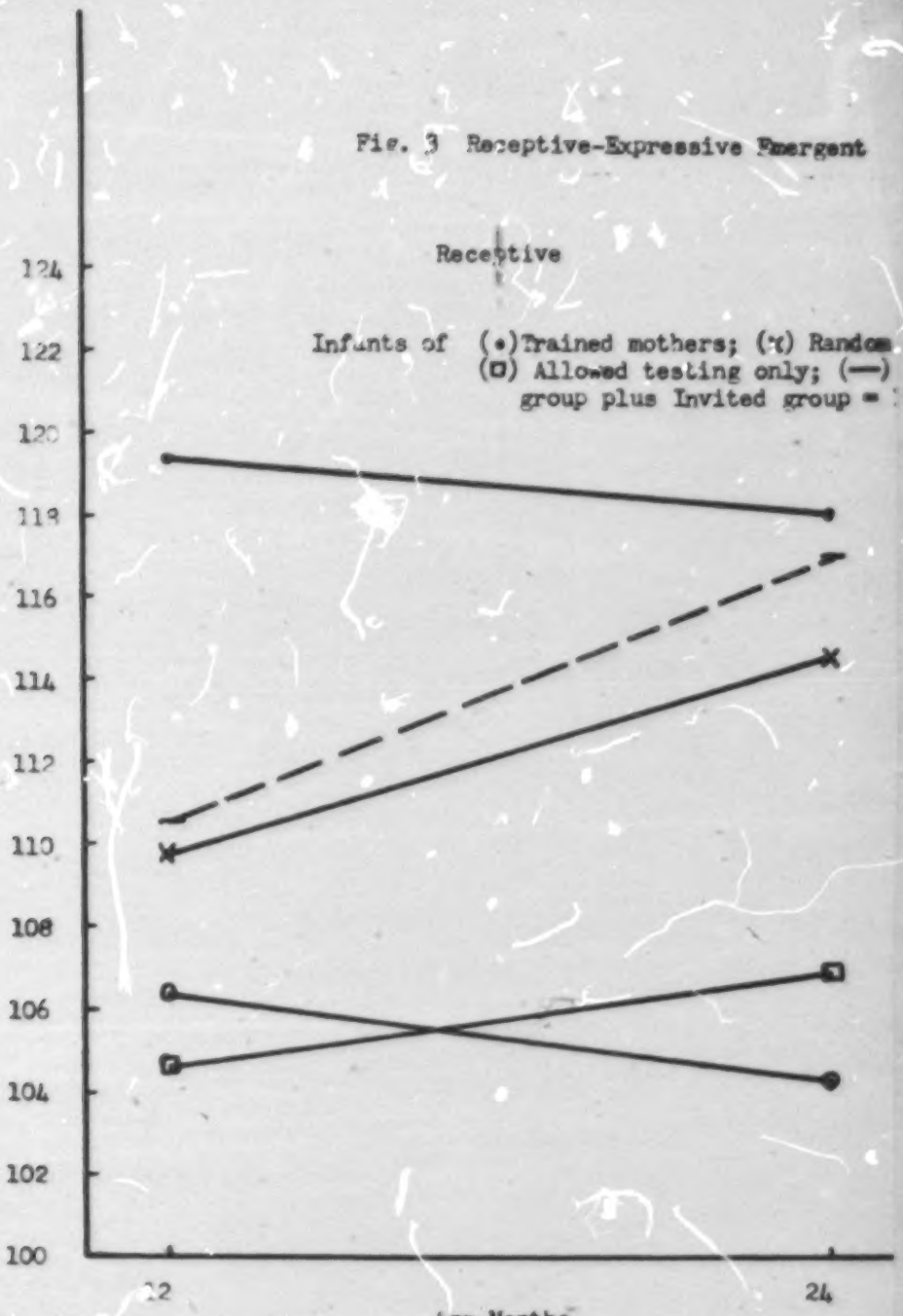
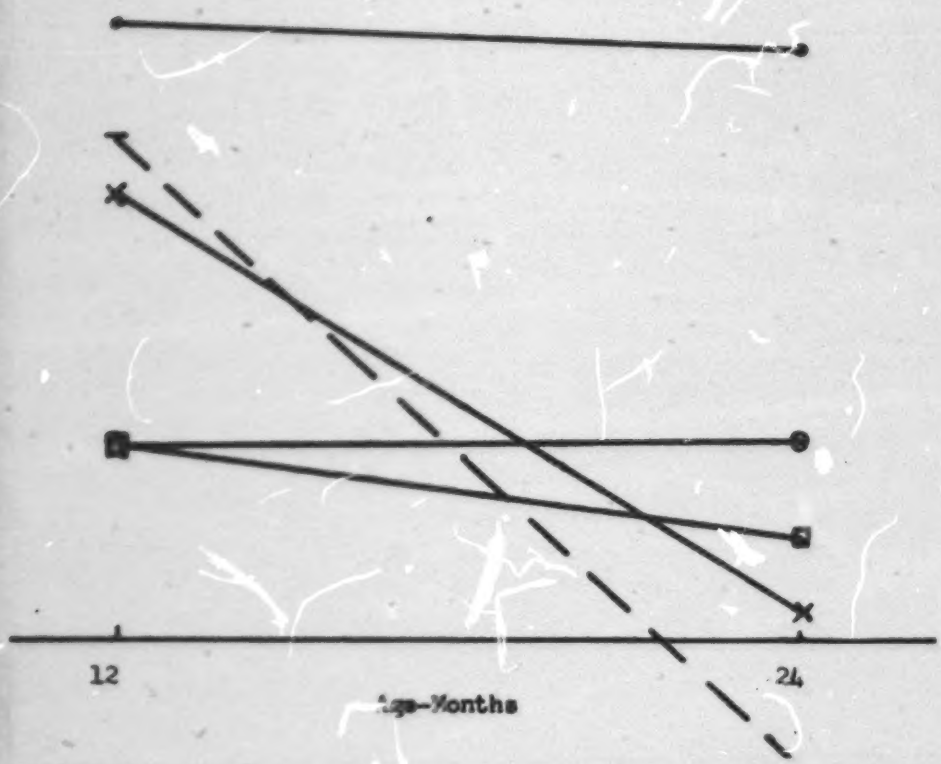


Fig. 3 Receptive-Expressive Emergent
Receptive
Infants of (•) Trained mothers; (×) Random
(□) Allowed testing only; (—)
group plus Invited group =
124
122
120
118
116
114
112
110
108
106
104
102
100
22
24
Age-Months

Language Scale Scores at One and Two Years

Expressive

controls; (o) Invited to class, did not come; Mean of Trained group if, originally, Trained Random group.



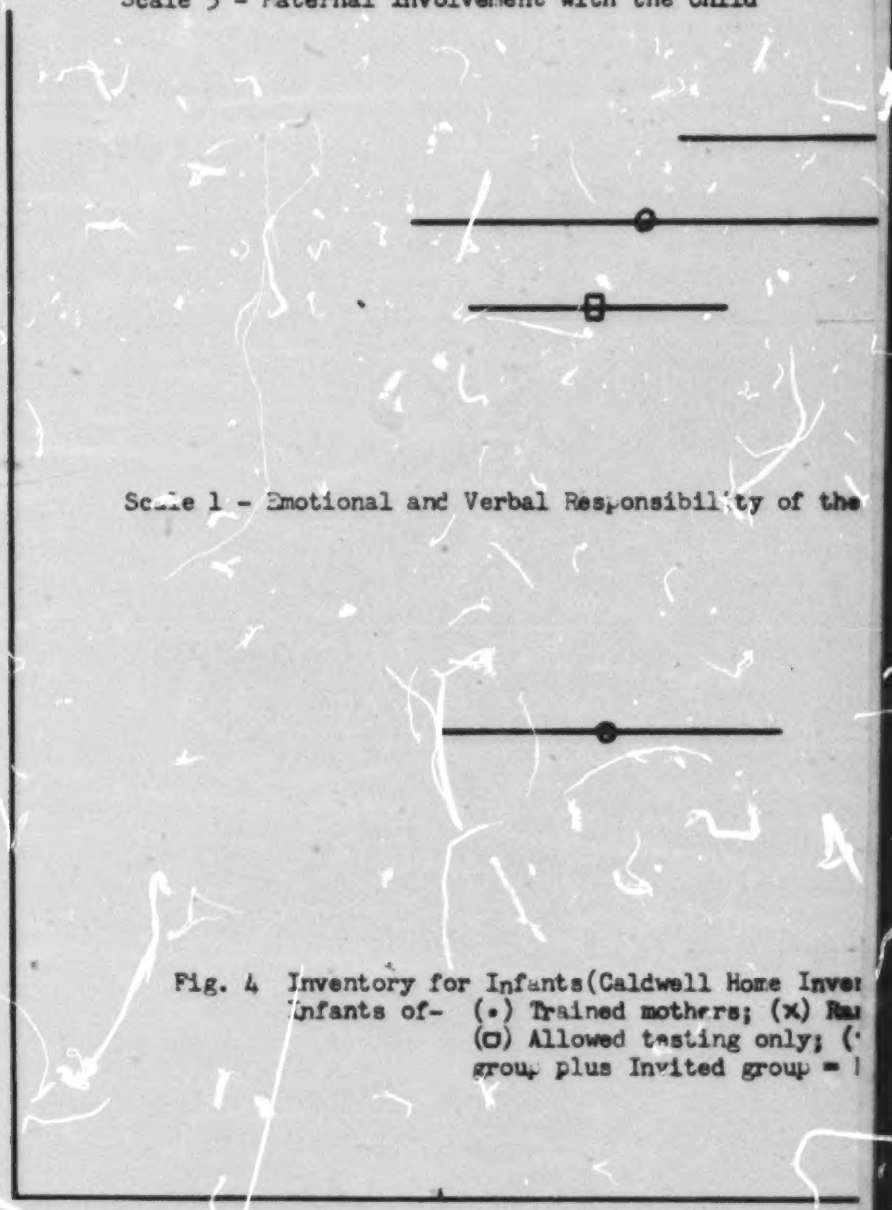
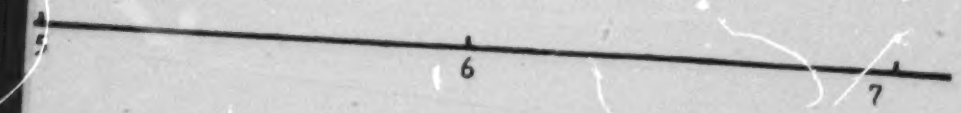


Fig. 4 Inventory for Infants(Caldwell Home Inve
Infants of- (•) Trained mothers; (x) Ra
(□) Allowed testing only; (
group plus Invited group =

Mother

ntory) - at 12 month testing.
dom controls; (O) Invited to class, did not come;
▽) Mean of Trained group if, originally, Trained
Random group.



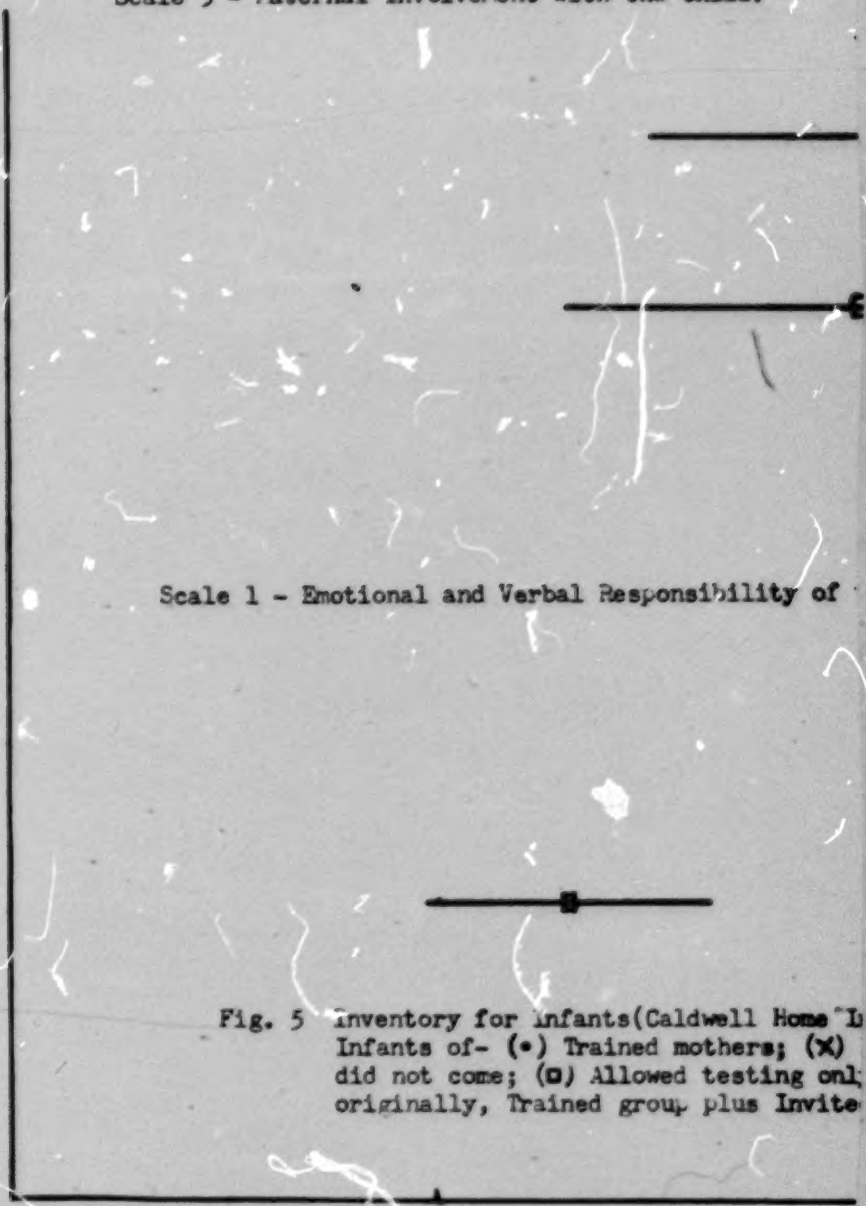
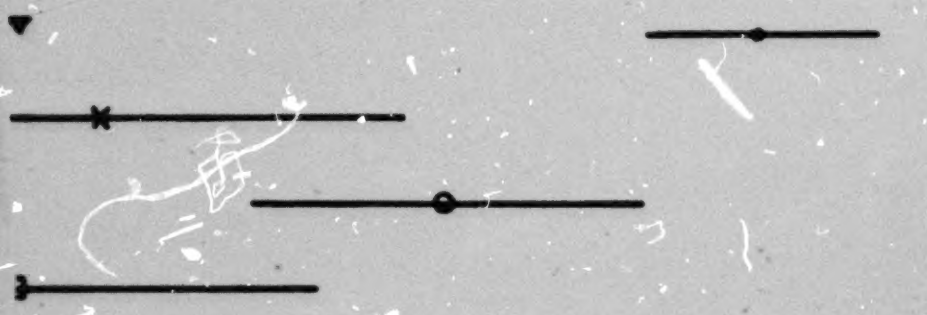
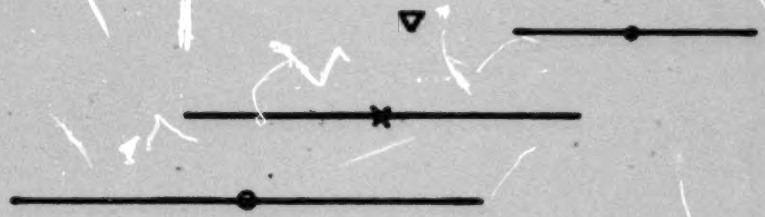


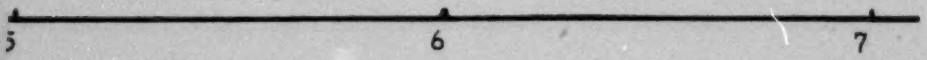
Fig. 5 Inventory for Infants(Caldwell Home Li
Infants of- (•) Trained mothers; (X)
did not come; (□) Allowed testing onl
originally, Trained group plus Invite

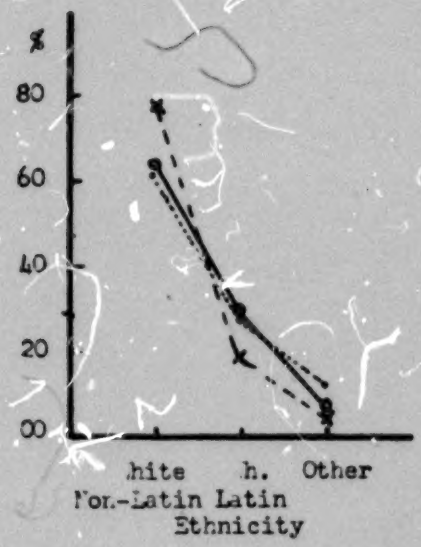


the Mother.



nventory) - at 24 Month testing.
Random controls; (o) Invited to class,
y; (▽) Mean of Trained group if,
d group = Random group.

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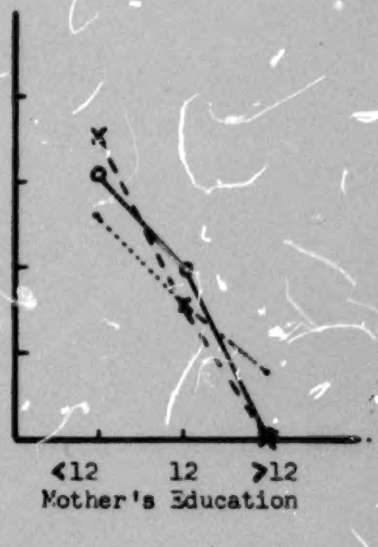
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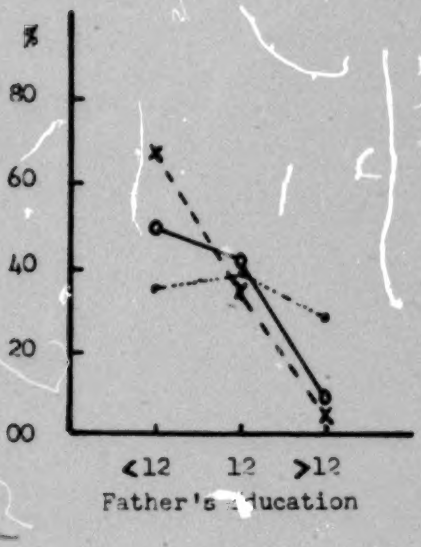
Mother's Education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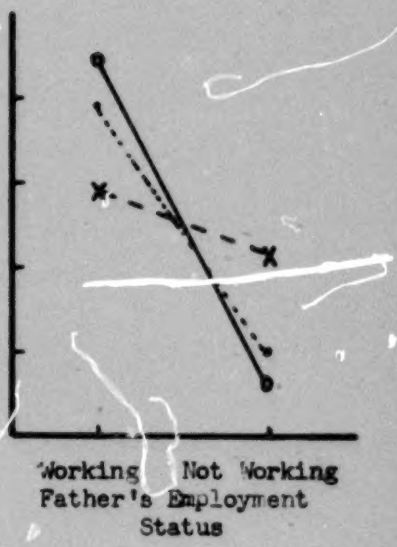
Father's Education


Working
Not Working
Father's Employment
Status

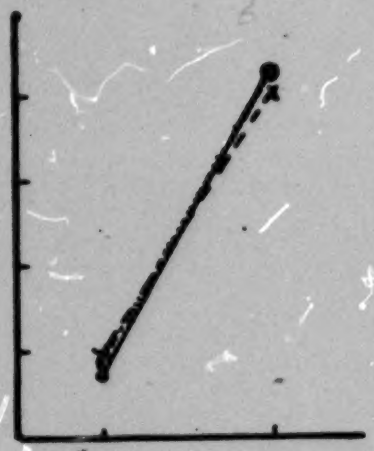
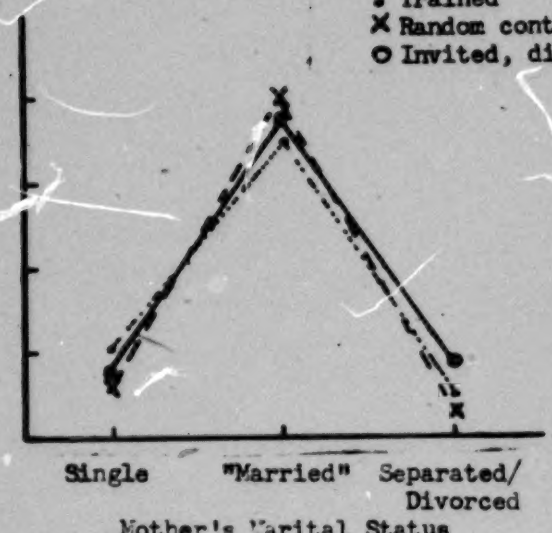
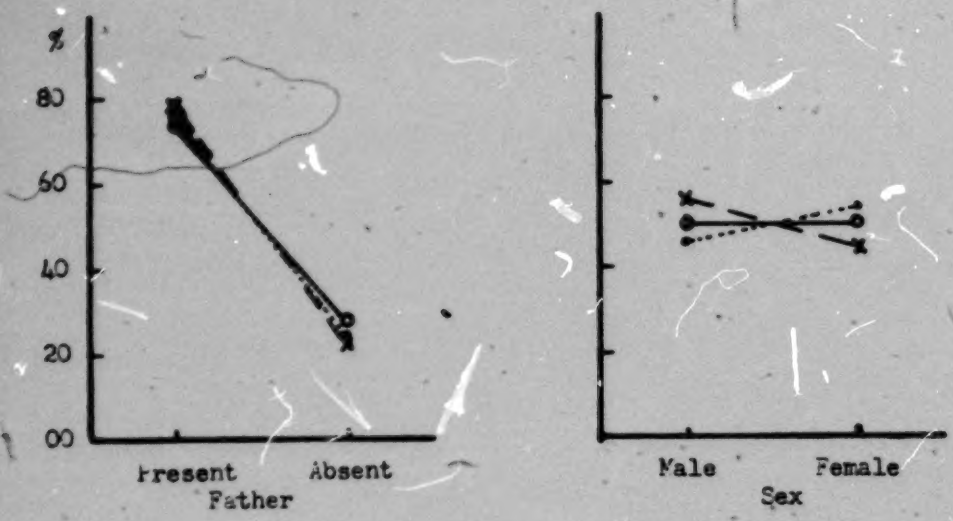


Fig. 6a Demographic Comparisons of treatment groups.
• Trained
X Random control
O Invited, did not come





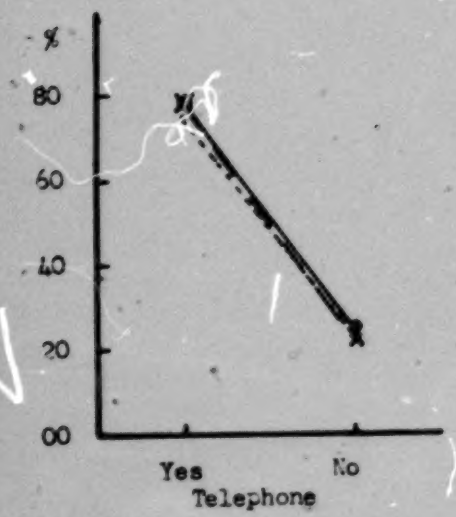
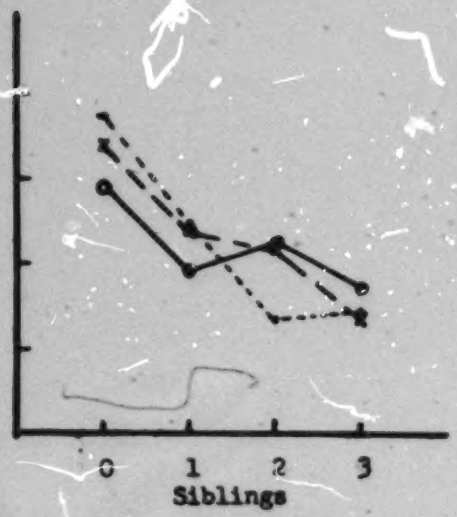


Fig. 6b Demographic Comparisons of Treatment Groups Infants of-

• Trained Mothers
X Random Control
o Invited, did not come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Siblings